Statistics 518/418 PROBABILITY
Fall 2019

From the Course Announcement:
Topics include random variables, distributions, transformations, moment generating functions, common families of distributions, independence, sampling distributions, and basic stochastic processes. Stat 518 will have more advanced assignments and examinations focusing on theoretical methods.

Instructor: Marek Kimmel, Professor, DCH 2102, x 5255, kimmel@rice.edu.
TAs: TBA

Evaluation
Two tests ***(different for Stat 481 and Stat 518)***, midterm (20%) and cumulative final (40%)
Unannounced short quizzes (10%)
Homeworks (***different for Stat 481 and Stat 518***, 30%)

Honor Code
Homeworks can be discussed in groups. Final redaction has to be done personally. Verbatim copying of homework assignments is a violation.
Tests and quizzes are under strict Honor Code rules and have to be completed without collaboration or help from others.

Attendance: Recommended

Text:
Casella and Berger "Statistical Inference", 2nd Ed., Brooks/Cole 2002
Course material Chapters 1 – 5, except for specific sections (different for Stat 418 and 518) as indicated by the Instructor.
Additional material mainly on Stochastic Processes based on lecture notes.

Lecture Notes and Study Guides: The class will be taught by performing mathematical derivations on the whiteboard along with projected slides. Study guides will be issued ahead of each test.

Problem solving sessions:
Dr. Kimmel will run non-obligatory problem solving sessions (frequency and place TBA) at which any problems, questions, derivations and so-forth, can be addressed.
TAs will also hold problem solving sessions each two weeks.

Office hours: TA: To be announced.
One-to-one meetings with Prof. Kimmel, by appointment

Contents and style of the course

Casella and Berger's book is an established academic manual and reference, covering mathematical foundations of statistics, including relevant aspects of probability theory. Presentation is kept at the elementary differential and integral calculus level and is mostly self-contained. The book includes a large number of instructive examples that illustrate the theory and help develop it in many directions.

The course is aimed at covering the full extent of material in Chapters 1-5 plus some additional material on stochastic processes at the end of the semester. ***Sections and proofs that will not be required, will be explicitly listed by the instructor (different lists for Stat 418 and Stat 518)***. It is difficult to cover all details in class; therefore, self-study from the book is essential. To facilitate this and provide interaction, the instructor will run non-obligatory problem solving and Q/A sessions (time and location TBD). Problems to discuss should be submitted in the morning the day before the session by email. In addition, the TA will run problem solving each two weeks

Chapters from Casella and Berger

1. Probability
2. Transformations and Expectations
3. Common Families of Distributions
4. Multiple Random Variables
5. Properties of Random Sample

Based on lecture notes

6. Basics of Poisson and Gaussian Stochastic Processes

Course objectives and outcomes:

1. Develop understanding of the mathematical structures underlying probability and statistics.
2. Develop skills and appreciation for mathematically rigorous statements and proofs.
3. Practice the transition from heuristic understanding of the problems to placing them in the frame of the theory and developing solutions.

Outcome: A toolbox of techniques to understand further advanced and specialized methods in statistics.

Students with disabilities are encouraged to attend: Regarding accomodations, please contact both the instructor and Disability Support Services at: http://dss.rice.edu/
In particular: A student with a disability has a responsibility to contact DSS if any accommodations are required. If accommodations are needed, the student with a documented disability will receive an accommodation letter from DSS to take to each instructor. It is the student's responsibility to deliver these letters as soon as possible. Instructors expect to receive notification early in each semester; students who deliver their letters later may encounter difficulties. Good, early communication is vital to the accommodation process.

Changes: The syllabus is subject to change with reasonable advance notice by the instructor.

Tentative Calendar of Classes

Aug 27 1.1, 1.2.1, 1.2.2
Aug 29 1.2.3, 1.2.4, 1.3
Sep 3 1.4, 1.5
Sep 5 1.6
Sep 10 2.1, 2.2,
Sep 12 2.3, 2.4
Sep 17 3.2
Sep 19 3.3
Sep 24 3.4, 3.5
Sep 26 3.6

Oct 1 4.1, 4.2
Oct 3 4.2
Oct 8 Midterm in class
Oct 10 4.3
Break
Oct 17 4.4
Oct 22 4.5, 4.6
Oct 24 4.7
Oct 29 5.1, 5.2
Oct 31 5.3
Nov 5 5.4
Nov 7 5.5 begin
Nov 12 5.5 cont
Nov 14 5.6
Nov 19 other
Nov 21 other
Nov 26 other
Thanksgiving
Dec 3 other
Dec 5 other